Chapter 1

INTRODUCTION

PURPOSE

This document addresses the Congressional House Appropriations Committee's request that EPA report on

(1) the Agency's analysis of the benefits of decentralized wastewater system alternatives compared to current (i.e., centralized) systems;
(2) the potential savings and/or costs associated with the use of these alternatives;
(3) the ability of the Agency to implement these alternatives within the current statutory and regulatory structure; and
(4) the plans of the Agency, if any, to implement any such alternative measures using funds appropriated in fiscal year 1997.

Appendix F addresses the Committee’s request to analyze the ability of rural electric cooperatives to upgrade facilities in rural areas. A separate response addresses privatization of municipal wastewater facilities, also requested by the Committee.

Responses to areas 1 through 4 are presented below. Following this Introduction is an analysis of the benefits of implementing decentralized treatment options (#1 above). It focuses on the factors that influence the selection of a wastewater system in a community and the conditions under which a decentralized or centralized system would be the best option. This is followed by an analysis of the potential costs and savings (#2 above) which examines comparative costs for centralized and decentralized wastewater systems using two hypothetical scenarios. Next, the document highlights barriers that inhibit the expanded use of decentralized systems and suggestions for overcoming the barriers. A section follows describing EPA’s ability and plans to implement the findings (questions #3 and #4 above), with appendices supplementing the text.

The House Appropriations Committee request highlighted several alternative approaches for managing wastewater, including:

- Targeted upgrades of treatment systems failing at individual homes.
- Innovative, high-performance technologies for pretreatment on lots characterized by shallow soils or other adverse conditions.
- Small satellite treatment plants or leaching fields in high-density areas.
- Detailed watershed planning to specify precise standards for sensitive versus non-sensitive zones.
- Maintenance, inspection, and water quality monitoring programs to detect failures in onsite systems.

These approaches are discussed throughout this document, particularly in the "Analysis of Benefits" section. Targeted upgrades of failing onsite systems are discussed in a variety of contexts, including the section on "Lower Capital Costs for Low Density Communities", which discusses why decentralized systems are most applicable for upgrading failing systems in small, rural communities and in ecologically sensitive areas. Examples of innovative or alternative technologies that provide additional treatment for sites with shallow soils and a variety of other hydro geological conditions are given in the section "Adaptable to Varying Site Conditions" and many such systems are described in Appendix A, "Definitions and Descriptions of Wastewater Systems." Small satellite treatment plants or leach fields which have low cost collector sewers are referred to as "cluster systems" or "package plants" throughout this report. Watershed planning and standards for targeting ecologically sensitive areas are discussed in the section on "Additional Benefits" and in Appendix B under "Comprehensive Planning." Maintenance, inspection, and monitoring programs are described in several sections related to management systems and Appendix C on "Management Systems."

SELECTED DEFINITIONS

Appendix A provides detailed definitions of many terms used in this document. There are several terms which are used extensively throughout this document and are defined here as well as in Appendix A.

- A **decentralized system** is an onsite or cluster wastewater system that is used to treat and dispose of relatively small volumes of wastewater, generally from individual or groups of dwellings and businesses that are located relatively close together. Onsite and cluster systems are also commonly used in combination.

- An **onsite system** is a natural system or mechanical device used to collect, treat, and discharge or reclaim wastewater from an individual dwelling without the use of community-wide sewers or a centralized treatment facility. A conventional onsite system includes a septic tank and a leach field. Other alternative types of onsite systems include at-grade systems, mound systems, sand filters and small aerobic units.

- A **cluster system** is a wastewater collection and treatment system where two or more dwellings, but less than an entire community, are served. The wastewater from several homes may be pretreated onsite by individual septic tanks or package plants before being transported through low cost, alternative technology sewers to a treatment unit that is relatively small compared to centralized systems.

HISTORY OF WASTEWATER MANAGEMENT

Onsite wastewater systems have been used since the mid-1800s, with technological advances improving the systems from simple outhouses to cesspools, to septic tanks, to some of the more advanced treatment units available today. In the 1970s and 1980s, large Federal investments in the construction of wastewater facilities focused primarily on large, centralized collection and treatment systems rather than on decentralized systems. Federal funds for wastewater systems increased significantly in 1972, as authorized in the Federal Water Pollution Control Act (later called the Clean Water Act). Municipalities used funds from the new Construction Grants program to build sewers and centralized treatment facilities to meet national standards for discharged pollutants (GAO, 1994). Between 1972 and 1990, the federal government spent more than $62 billion in this program for constructing or upgrading treatment facilities (Lewis, 1986).

The initial decision to install a particular system (i.e., hookup to a centralized system or use onsite systems) was primarily made in the private sector by the developer of a property, based on affordability or profitability. In small communities, developers often chose more affordable onsite systems which could be easily installed for each dwelling. Once installed, the onsite system was usually not examined again unless an emergency situation arose, with wastewater either backing up into backyards or streets even though in many cases, they were contributing to pollution of ground water and nearby surface waters. In most small communities, outdated state and local regulatory codes still promote the continued use of poorly maintained conventional onsite systems (a septic tank and leach field). In many of these communities, these systems are providing adequate public health and environmental protection, but in many cases, they are not.

The 1990 Census indicates that 25 million households use conventional onsite systems or cesspools. Data on the failure rate associated with these systems is limited; a national estimate is not available. However, during 1993 alone, a total of 90,632 failures were reported, according to a National Small Flows Clearinghouse survey of health departments across the country. Failure rates as high as 72 percent have been documented, such as in the Rouge River National Demonstration Project. Nationwide data show that failures of onsite wastewater systems are primarily due to improper siting (e.g., in low-permeability soils), improper design, poor installation practices, insufficient operation and maintenance of the systems, and lack of enforcement of codes. Some communities, such as Stinson Beach, CA (see Appendix E) and Warwick, RI, explored ways to prevent future failures, including managing decentralized systems to ensure that they were operated and maintained appropriately, and using alternative types of systems where site conditions made conventional onsite systems marginally applicable. During the 1970's, a number of state and local governments, including Gardiner, NY and Wood County, WV, with the support of the U.S. EPA Research and Development programs, experimented with different types of decentralized systems that could accommodate a variety of site and community conditions and meet environmental protection goals if properly operated and maintained. Subsequently, in the 1980's, the Innovative and Alternative (I&A) Technology and Small Community set-asides of the Construction Grants program resulted in the construction of hundreds of small community technologies using centralized and decentralized approaches. Both programs provided some information on performance and costs of newer decentralized systems.

Circumstances changed in 1990, when the federal Construction Grants and I&A programs were eliminated. These programs were replaced by the Clean Water State Revolving Fund program, which provides communities with low interest loans. These programs have only been able to meet a small portion of the total needs. EPA's 1992 Needs Survey estimated the nation's documented wastewater needs to be $137 billion, with an increase of 39 percent from 1990 to 1992 (EPA, 1993). Small community needs comprised approximately 10 percent (over $13 billion) of total unmet needs in 1992. Furthermore, EPA estimated that replacing failing septic systems with new centralized system sewers and treatment facilities accounted for 40 percent of the small community needs (EPA, 1993).

Managed decentralized wastewater systems are viable, long-term alternatives to centralized wastewater facilities where cost-effective, particularly in small and rural communities. Decentralized systems already serve one-quarter of the population nationwide, and 50% of the population in some states. These systems merit serious consideration in any evaluation of wastewater management options for small and mid-sized communities and new development. In some cases, combinations of decentralized and centralized arrangements will be useful to solve diverse conditions.

Chapter 2

ANALYSIS OF BENEFITS

WASTEWATER SYSTEM GOALS

Wastewater systems have two fundamental goals:

- o Protection of public health (e.g., from waterborne disease-causing organisms such as bacteria; from high nitrate levels in ground water).
- o Protection of the environment (e.g., protection of surface waters from eutrophication caused by excess phosphorus and nitrogen).

If properly sited, designed, installed and managed over their service lives, decentralized wastewater systems can, and do, meet both public health and environmental protection goals in areas where centralized treatment is impractical or not cost-effective. This section discusses why a decentralized system is often the most feasible choice for small communities.

The Clean Water Act, as amended, identifies federal requirements for wastewater treatment facilities discharging to waters of the U.S., i.e., a minimum of secondary treatment and water quality standards. Decentralized systems which discharge to a surface water must, and can, meet these requirements. Conventional onsite systems discharge effluent through the soils to the groundwater. Groundwater can be protected with properly maintained onsite systems or with additional treatment to control nutrients.

In addition, the Safe Drinking Water Act addresses the risk to groundwater quality posed by the large capacity septic systems (systems with the capacity to serve 20 or more persons per day). EPA includes large capacity septic systems as a type of Class V well which are regulated within the Underground Injection Control program to protect ground waters.

BENEFITS OF DECENTRALIZED WASTEWATER SYSTEMS

For certain communities and site conditions, managed decentralized wastewater systems are the most technically appropriate and economical means for treating wastewater when compared to centralized treatment systems. The primary benefits of using decentralized systems are:

- o Protects public health and the environment
- o Lower capital and maintenance costs for low density communities
- o Adaptable to varying site conditions
- o Additional benefits

How these factors affect the selection of wastewater systems is discussed below. For a more detailed discussion of cost-effectiveness, see the "Potential Costs and Savings" section of this document.

Protects Public Health and the Environment

Properly managed decentralized wastewater systems can provide the treatment necessary to protect public health and the environment including groundwater and surface waters, just as well as centralized systems. Decentralized systems can usually be sited designed, installed and operated to meet all federal and state required effluent standards for biological oxygen demand (J3OD), total suspended solids (TSS) and fecal coliform. Effective advanced treatment units are available for additional nutrient removal and disinfection requirements for both types of systems, as well.

Centralized systems frequently result in large watershed transfers of waters, whereas decentralized systems when used effectively promote the return of treated wastewater within the watershed of origin. Managed decentralized systems can effectivelyminimize the impacts of these interbasin water transfers.

Lower CapitaI and Maintenance Costs for Low Density Communities

In areas with low population densities (approximately one dwelling or less per *acre)*, decentralized onsite wastewater systems often are the most cost-effective option for upgrading failing septic systems or serving new development. Constructing new centralized systems in rural areas is often economically unfeasible because of the distances between homes, the significant piping required to tie-in all the connections, and the inability to achieve economies of scale (i.e., a certain number of users to support system costs).

In urban and suburban areas with high population densities (more than three to four dwellings per acre), large-scale, centralized collection and treatment of wastewater is usually most cost-effective.

For areas with moderate population densities (one dwelling per one-half to one acre) located at moderate distances from a centralized treatment facility, the choice of a centralized or decentralized wastewater system may vary by neighborhood based on local conditions. Moderately populated areas may effectively use decentralized cluster wastewater systems that serve two or more (up to several hundred is possible) homes and are located close to the dwellings they serve. These *cluster* systems are cost-efiective in many cases because they use smaller, less expensive collection pipes that travel relatively short distances to smaller, less maintenance intensive treatment units (often with soil disposal or reuse of effluent). As long as homes are relatively close together, cluster systems may be cost-competitive with numerous individual onsite systems.

Adaptable to Varying Site Conditions

In the past, when fewer types of decentralized wastewater systems were available, certain site conditions, such as high ground-water tables, impervious soils, shallow bedrock or limestone formations, were considered limiting factors that precluded decentralized systems. In many cases, septic tank/leach field systems were nonetheless used at many such sites, with inadequate subsequent protection of surface and ground water. Today, however, decentralized systems can usually be designed for a specific site and its hydrogeological conditions. For example, sand mounds systems are designed specifically for sites with high ground water. Decentralized wastewater systems now allow greater flexibility and are often combined into treatment trains to meet a range of treatment goals and site conditions. A treatment train might include a septic tank and recirculating sand filter (or other types of technologies) to greatly reduce BOD, TSS, nitrogen, and bacteria levels; a relatively small leach field (a larger leach field becomes unnecessary with the additional treatment provided by a sand filter or other treatment units); and multiple dosing of effluent to the leach field on sites with excessively permeable soils.

Additional Benefits

Decentralized systems can be advantageous in ecologically sensitive areas, where treatment must be specifically targeted to local environmental concerns (e.g., ground water protection and protection of off-shore shellfish beds or where construction of centralized collection systems may disrupt the ecosystem). Also, most decentralized onsite systems inherently include on-lot water reuse and ground-water recharge. The wastewater can be treated by decentralized systems to a specified level and then retained for reuse near (usually outdoors) the home or facility (e.g., outside for irrigating the landscape). Such reuse is most common in industrial settings and is beginning to occur in commercial settings (e.g., office parks, golf courses); however, certain types of industrial facilities may require pretreatment if wastes are toxic. In certain water-short states (e.g., Arizona, California Florida Texas), such reuse is even practiced in residential settings. ”

CONCLUSION

Communities Can Use Combinations of Decentralized Wastewater Systems

For communities with a diversity of locales, the best option might be to use a combination of wastewater systems. For example, in more densely populated areas, hookup to a centralized facility might be most cost-effective. Decentralized cluster systems could be chosen for less densely populated fringe areas currently under development and for use in ecologically sensitive areas. Onsite systems could be used in the more rural areas. Considering all possible options and their combinations is the best approach to managing wastewater needs to achieve the most cost-effective solution for a variety of site conditions and community goals.

Chapter 3

POTENTIAL COSTS AND SAVINGS

Cost is a key factor that affects the selection of wastewater management options for a community. The cost of these options varies depending on specific community characteristics, including population size and density, topography, distance to an existing treatment facility, and local performance requirements. These variables make it difficult to present a valid national comparison of costs for decentralized and centralized systems. To illustrate the differences in the cost-effectiveness of various technology options, cost estimates were developed for two hypothetical communities. Several components of the cost estimates presented may vary considerably from community to community, and may impact the cost-effectiveness of one technology option over another option. For example, land costs vary regionally and may be prohibitive in some communities for construction of large treatment facilities.

Descriptions of the two hypothetical communities on which cost estimates were based are presented below, followed by a summary of the technology options considered for different areas in the communities with different population and site characteristics; and a comparative summary of costs for different types of wastewater management options.

Costs are based on a variety of sources, including cost equations for centralized collection developed by Dames and Moore (based on Smith, 1978); centralized treatment costs presented in the WAWTTAR computer model developed at Humboldt State University (Gearheart et al., 1994); costs for small diameter gravity sewers presented in EPA documents (EPA, 1991; EPA Region IV, n.d.) and in Abney, 1976; cluster treatment costs presented in Abney, 1976 and Otis, 1996; onsite system treatment and operation and maintenance costs used in the COSMO computer model, developed at North Carolina State University (Renkow and Hoover, 1996); average land purchase costs, based on data for North Carolina; and equipment and labor costs based on data from Wisconsin. A detailed description of the cost estimation methodologies used for each type of wastewater collection and treatment technology is presented in Appendix D.

COMMUNITY PROFILES

Costs are presented for (1) a hypothetical small, rural community, and (2) a hypothetical community located on the fringes of a metropolitan center (referred to as the "fringe" community). The profiles of both types of communities are described below.

Rural Community - The rural community has a population of 450 people living in 135 homes. These homes are located on 1-acre lots or larger lots and are serviced by conventional onsite wastewater systems consisting of septic tanks and leach fields; wastewater is transported from the tanks to the leach fields through gravity distribution. About 50 percent of the onsite systems (67 systems) are currently failing due to inadequate sizing, inappropriate site conditions, systems (67 systems) are currently failing due to inadequate sizing, inappropriate site conditions, or lack of maintenance. As shown in Figure 1a, these 67 failing systems are located in the . northeastern section of the community near a river where there is a high water table and a prevalence of soils with low permeability.

Fringe Community - The fringe community, located 10 miles from the nearest city, has a current population of 770 people in 220 homes, but is expected to grow to a total population of 1,550 people in 443 homes located on l/2-acre lots. The existing homes are serviced by conventional onsite wastewater systems consisting of septic tanks and leach fields; wastewater is transported from the tanks to' the leach fields through gravity distribution. As shown in Figure lb, about 50 percent of the existing onsite systems (110 systems) are currently failing due to inappropriate site conditions, including a high water table and soils with low permeability, and lack of maintenance. The metropolitan area is serviced by a centralized collection and treatment facility with unused capacity (10 miles away).

For comparative purposes, costs for centralized, cluster, and decentralized onsite systems are provided for both the rural and fringe communities, as described below.

TECHNOLOGY OPTIONS AND PERFORMANCE GOALS

The technology options considered for the rural and fringe communities are summarized below. All of the options considered are assumed to be capable of achieving the secondary treatment standard of 30 mg/L for BOD and TSS, as well as disinfection goals for significant bacteria reduction disinfection of cluster and onsite system effluent is provided by physical and biological processes as the effluent moves through the soil.

Appendix D ("Cost Estimation Methodology") provides a detailed description of each technology, the methodologies and assumptions used in developing the cost estimates, and the capital costs and annual operating and maintenance (O&M) costs for each technology. Appendix D also includes a discussion of how costs were indexed to 1995 dollars.

Rural Community - Wastewater options considered for the rural community include:

o ***Centralized system - New*** conventional gravity collection servicing the entire rural community and construction of a new centralized treatment facility, with treatment consisting of a facultative oxidation pond and disinfection. This has been the most frequently used option to address the small community problems described in this report.

0 ***Cluster systems - New*** alternative collection (small diameter gravity sewers [SDGS]) and construction of new small cluster treatment systems, each consisting of a sand filter and a central leach field (cluster systems would be installed only

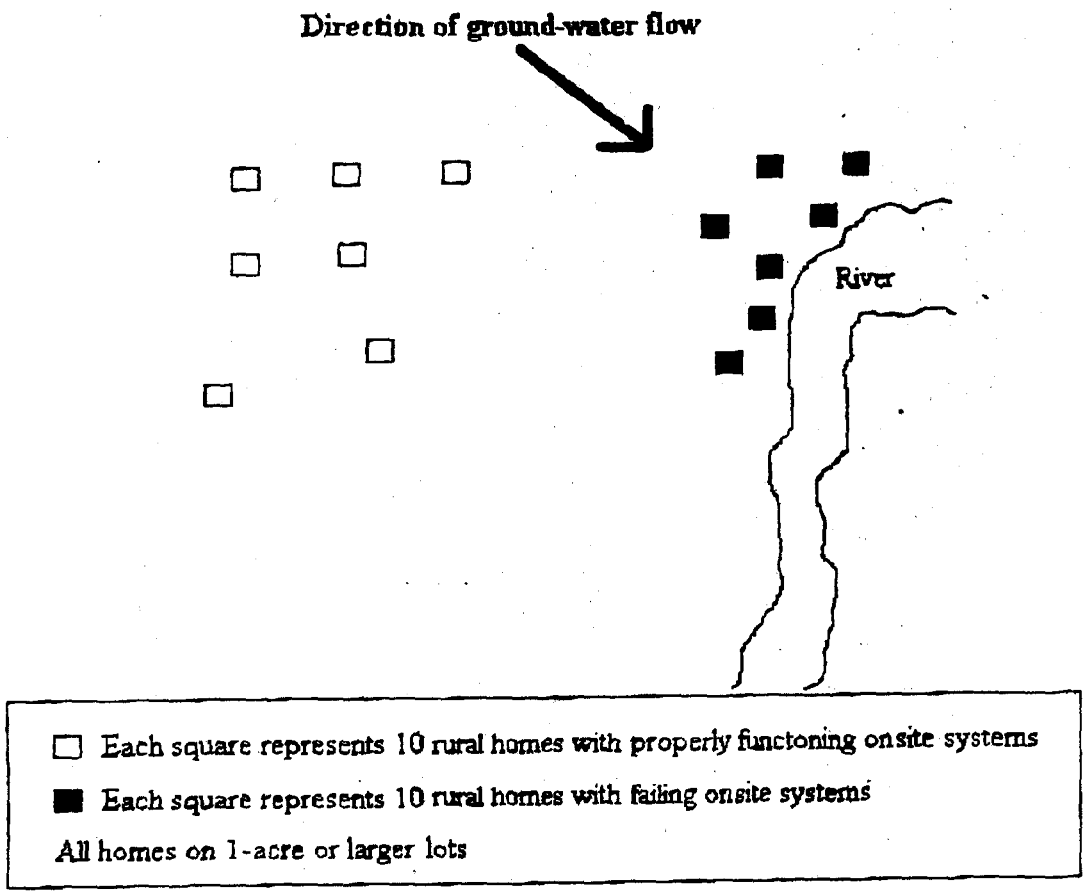
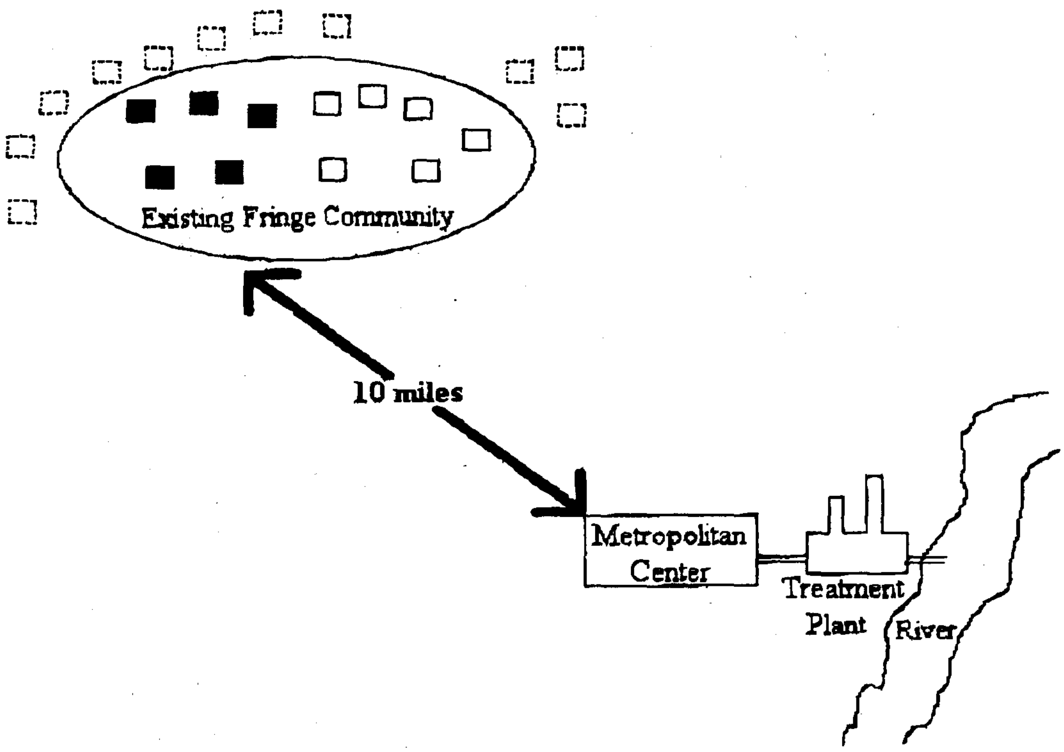


Figure 1a - Base Map of Hypothetical Rural Community



☐ Each square represents 20 fringe community homes with properly functioning onsite systems
■ Each square represents 20 fringe community homes with failing onsite systems
⬚ Each square represents 20 fringe community homes - expected new development
All homes on 1/2-acre or smaller lots

Figure 1b - Base Map of Hypothetical Fringe Community

where onsite systems are currently failing; properly functioning onsite systems would continue in use).

- o *OnSite systems* - Replacement of failing conventional onsite systems (septic tanks and leach fields) with new onsite systems consisting of septic tanks, intermittent sand filters where necessary, and leach fields; low pressure pipe (LPP) distribution would be used to transport the wastewater from the septic tanks up to, and through the leach fields. The sand filters and LPP distribution address the issues of a high ground-water table and low-permeability soils.

Fringe Community - Wastewater options considered for the fringe community include:

- o . *Centralized system (two* options considered) - A new conventional gravity collection system connected to an existing centralized treatment facility that currently serves the main municipality. In option 1, the facility has sufficient collection and treatment capacity, and in option 2, the facility has suilicient capacity to handle the added load to the sewers, but requires additional treatment capacity. Treatment for both centralized options is provided by a sequencing batch reactor (SBR) with grit removal, screening, disinfection and sludge disposal.

- o *Cluster systems - New* alternative collection (small diameter gravity sewers [SDGS]) and construction of new small cluster treatment systems, each consisting of a central sand filter and a central leach field; for new homes, the installation of new onsite septic tanks which connect to the SDGS.

- o *OnSite systems -* For existing homes, replacement of failing onsite systems with new onsite systems consisting of septic tanks, intermittent sand filters where necessary, and leach fields, with wastewater transported up to, and through the leach fields with low pressure pipe (LPP) distribution for new homes, installation of new onsite systems consisting of septic tanks and leach fields, with wastewater transported to the leach fields with low pressure pipe distribution (LPP).

SUMMARY OF COSTS

Cost summaries and comparisons for each technology option considered are presented below. Costs include the capital costs necessary to install the system(s) and the annual costs to operate and maintain the system(s). Capital costs were annualized over 30 years (the life of the system) for each technology option using a discount rate of 7 percent (OMB, 1996). All costs are presented in 1995 dollars. Table 1 presents a summary of the estimated costs for the rural community. Similarly, Table 2 presents the costs for the fringe community.

Table 1. Summary of Rural Community Technology Costs			
Technology Option[1]	**Total Capital Cost (1995 $)**	**Annual O&M Cost[2] (1995 $)**	**Total Annual Cost (Annualized Capital Plus O&M - 1995 $)**
Centralized systems[3]	$2,321,840 - $3,750,530	$29,740 - $40,260	$216,850 - $342,500
Alternative SDGS collection and small cluster systems[4]	$598,100	$7,290[6]	$55,500
Onsite systems[5]	$510,000	$13,400[6]	$54,500
Note: The rural community consists of 450 people in 135 homes			

[1]All technology options presented are assumed to have a 30-year life span.

[2]O&M costs include: centralized system - treatment chemicals such as chlorine and sulfur dioxide, energy to run equipment such as mixers, pumps, and aerators, and labor; cluster system - yearly inspections of onsite components including sand filter, quarterly inspections of the central leach field, 10-year pumpouts of individual septic tanks, replacement of distribution pump every 10 years; onsite systems - quarterly inspections of systems, including septic tanks, leach fields, and sand filters, pumpouts of septic tanks and replacement of distribution pumps every 10 years; the establishment of an organization to provide wastewater management assumes that maintenance of all existing and future onsite systems will be performed; therefore, the annual O&M cost estimates include costs for new systems as well as existing onsite systems that are still functioning effectively.

[3]Represents conventional gravity collection and construction of a new centralized treatment plant within the rural area, consisting of a facultative oxidation pond and disinfection; the conventional gravity collection system costed for the rural community was evaluated for two population densities (1 home per acre and 1 home per 5 acres), and therefore a range of costs are presented for this technology option.

[4]Includes intermittent sand filters and gravity distribution to leach fields where onsite systems are failing.

[5]Includes replacement of failing onsite systems with (1) onsite systems consisting of septic tanks with LPP distribution to leach fields where soils have poor drainage and (2) onsite systems consisting of septic tanks and sand filters with LPP distribution to leach fields where water table is high.

[6]O&M costs for cluster systems are lower than O&M costs for onsite systems because of the lower labor requirements for operating and maintaining a single centralized sand filter and leach field in a cluster system than for operting and maintaining up to 135 individual onsite sand filters and leach fields.

Table 2. Summary of Fringe Community Technology Costa

Technology Option[1]	Total Capital Cost (1995 $)	Annual O&M Cost[2] (1995 $)	Total Annual Cost (Annualized Capital Plus O&M - 1995 $)
Centralized systems[3] -			
System type #1:			
at 1 mile from existing sewer	**$3,322,900**	**$83,800**	**$351,600**
at 5 miles from existing sewer	**$5,377,800**	**$95,900**	**$529,300**
system type #2:			
at 1 mile from existiug sewer	**$3,786,900**	**$83,800**	**$389,000**
at 5 miles from existing sewer	**$5,841,800**	**$95,900**	**$566,700**
Alternative SDGS collection and small **cluster systems**[4]	**$3,783,700**	**$18,000**[6]	**$322,900**
Onsite system[5]	**$2,117,100**	**$59,240**[6]	**$229,900**

Note: The fringe commumity consists of 1,550 people in 443 homes (includes future growth

[1]All technology options presented are assumed to have a 30-year life span.

[2]O&M costs include: centralized system - treatment chemicals such as chlorine and sulfur dioxide, energy to run equipment such as mixers, pumps, and aerators, and labor; cluster system - yearly inspections of onsite components including sand filter, quarterly inspections of the central leach field, 10-year pumpouts of individual septic tanks, replacement of distrlbution pump every 10 years; onsite systems - quarterly inspections of systems, including septic tanks, leach fields, and sand filters, pumpouts of septic tanks and replacement of distribution pumps every 10 years; the establishment of an organization to provide wastewater management assumes that maintenance of all existing and future onsite systems will be performed; therefore, the annual O&M cost estimates include costs for new systems as well as existing onsite systems that are still fimctioning effectively.

[3]System type #1 represents conventional gravity collection connected to an existing sewer and treatment system that already has adequate capacity to handle the additional load; System type #2 represents conventional gravity collection connected to an existing sewer system that already has adequate sewer capacity but requires expanded treatment capacity to handle tie addtional load. For both systems, treatment consists of an SBR and disinfection.

[4]1ncludes central intermittent sand filters and gravity distribution to central leach fields.

‘Represents onsite systems consisting of septic tanks with LPP distribution to leach fields for new homes; replacement of failing onsite systems with (1) onsite systems consisting of septic tanks with LPP distribution to leach fields where soils have poor drainage and (2) onsite systems consisting of septic tanks and sand flilters with LPP distribution to leach fields where water table is high.

[6]O&M costs for cluster systems are lower than O&M costs for onsite systems because of the lower labor requirements for operating and maintaining a single centralized sand filter and leach field in a cluster system than for operating and maintaining up to 443 individual onsite sand filters and leach fields.

Rural Community Costs - As shown in Table 1, for the rural community, the most cost-effective option for meeting performance goals is using new onsite systems to replace the old onsite systems that are failing. The newer onsite systems will include low pressure pipe distribution (LPP) to achieve effective operation in areas with poor soil drainage, and sand filter and LPP in areas with a high water table to provide additional treatment before the effluent reaches the water table. The use of cluster systems with alternative collection for the failing onsite systems is not significantly more expensive; if soils were unsuitable for onsite systems, the cluster alternative would be the best choice. As the distance between homes in the rural area increases, however, cluster system collection costs would increase. Compared to the onsite or cluster system options, centralized collection and treatment is not cost-effective.

Fringe Community Costs - A summary of the estimated costs for the fringe community is presented in Table 2, including total capital costs, annual O&M costs, and the total annual cost (i.e., annualized capital plus annual O&M) for each option.

Table 2 shows that for the fringe community, in this instance, installing new onsite systems to replace the old onsite systems that are failing and new onsite systems for new homes would be the most cost-effective option. However, construction of cluster systems with alternative collection might be the preferred option in this type of growing community where space may be limited for individual onsite systems. In cases where a fringe community is relatively close to a sewer interceptor (e.g., 1 mile), and the existing centralized collection and treatment facility can accept the additional wastewater loadings, it might be cost-effective. If a fringe community is located relatively far from a sewer interceptor (e.g., 5 miles), centralized collection and treatment may not be cost-effective, especially if treatment and collection facilities require upgrading to handle additional flows. These results are typical of fringe communities,' which are often "gray" areas regarding costs; that is, depending on their proximity to existing centralized facilities and their population densities, the most cost-effective option for fringe communities often varies depending on site-specific conditions. Long term growth also maybe a factor in determining the most appropriate solution. Additionally, the assimilative capacity of the receiving environment may limit the utility of centralized systems that discharge to surface waters.

CONCLUSIONS

Results of the cost analysis indicate decentralized systems, whether onsite or cluster systems, are generally cost effective means of managing wastewater in rural communities due to the distance between homes and land availability. In small communities and fringe areas of metropolitan cities, the most cost effective solution depends on population density, distance to the sewer interceptor, and availability of land. The centralized alternative can be competitive with decentralized options infringe areas, where the distance to the intercepting sewer is less than 5 miles and the receiving water body can accommodate the additional waste load. Although excluded from this analysis, the relative costs of failure for centralized systems can be far greater, given that all wastewater is concentrated at a central location (point source).

Chapter 4

OVERCOMING BARRIERS TO IMPLEMENTING DECENTRALIZED WASTEWATER TREATMENT OPTIONS

Several important barriers currently inhibit the expanded use of decentralized wastewater systems, including:

- Lack of knowledge and misperception of decentralized systems
- Statutory and regulatory barriers at the state and local level, including:
  - Lack of enabling legislation
  - Legislative authority that is split between agencies
  - Prescriptive regulatory codes
- Lack of adequate management programs for decentralized systems in many regions
- Liability and engineering fee issues
- Financial limitations

These barriers, and steps that have or can be taken to overcome them, are discussed below.

LACK OF KNOWLEDGE AND MISPERCEPTION OF DECENTRALIZED SYSTEMS

Public health officials, engineers, regulators, system designers, inspectors and developers often possess only limited knowledge of the broad range of decentralized wastewater systems because these technologies are not adequately covered in university engineering curricula. Decentralized systems are perceived to be inadequate for meeting specified public health and water quality goals. Centralized wastewater treatment facilities meet these goals by complying with regulatory and permit standards (e.g., secondary treatment standards of 30 mg/L TSS and BOD). Appropriately sited and adequately designed and maintained, decentralized wastewater systems can meet public health and water quality goals, as well.

Typically, onsite systems are perceived as the standard septic tank and leach field (referred to as conventional onsite systems in this document). However, alternative onsite systems include other types of decentralized systems, such as mound systems or sand filters. Conventional onsite systems can pose a threat to ground water, however, these systems can be designed to alleviate the threat through retrofitting existing treatment trains or with new systems that include the appropriate unit processes (Anderson et al., 1985; Ayres, 1991; Ball, 1995; Boyle, 1995; Cagle and Johnson, 1994; Hines and Favreau, 1975; Jenssen and Siegrist, 1990; Laak, 1986; Piluk and Peters, 1994; Soltman, 1989; Tchobanoglous and Burton, 1991). Recognizing that performance standards should apply to any type of wastewater system, a few states, including Florida, North Carolina, Washington and Wisconsin, have recently begun the process of setting performance standards for decentralized systems.

Homeowners are frequently uninformed about how their conventional onsite systems work, how to maintain them, and about the potential for human health and ecosystem risks from poorly functioning systems. The prevailing public perception of conventional onsite systems is they are maintenance free. Regulators and technical professionals may have little experience with alternative systems because these technologies are not included in their educational curricula and little effective training is available.

Another factor blocking acceptance of decentralized systems is the lack of comprehensive performance and cost data, or where data is available, an evaluation of the results is needed. EPA's Innovative and Alternative Technology program yielded a limited number of technology evaluations before the program and efforts to conduct assessments ended. In 1995, EPA began to fund the assessment effort again. EPA-funded assessments and fact sheets on these technologies will be published in the near future, but these efforts will mostly cover surface water discharge technologies.

Overcoming the Lack of Knowledge Barrier . Education is critical to effective efforts to encourage the acceptance and use of decentralized systems. Those who choose, design, and use these systems need to know that they perform well if properly managed. Information on what proper management entails should be readily available and widely distributed. Professional training and certification programs should cover regulatory code requirements, system siting, soils fieldwork, design, construction, monitoring and maintenance. Federal, state, local, or private agencies can provide classroom and in-field training. Six states, Arizona, Missouri, North Carolina, Rhode Island, Texas, and Washington, currently have training programs for sanitarians and installers. Since the advent of these programs, state regulatory officials (in North Carolina, for example) have allowed the utilization of a much broader array of advanced onsite technologies under the condition that these systems are managed by professional, certified operators. Similar training and certification programs in other states are a necessary precursor to broad scale use of decentralized technologies. With the participation of nationally recognized authorities and product manufacturers and the issuance of certificates of competency, these programs could produce a well-trained field of regulators and service providers.

In addition, educational materials for homeowners should explain proper wastewater disposal and maintenance practices and the consequences of system failures. Informed, responsible homeowners would help ensure that their systems are operated and maintained properly and they will be more likely to support new management programs. Training and education to increase awareness about decentralized wastewater systems should help reduce both the number of failing systems and adverse impacts on ground and surface water.

Establishment of testing centers for verification of decentralized wastewater treatment technologies is expected in the future and can enhance the confidence that these systems will perform as designed. States would need to agree to accept the testing results from these centers.

STATE/LOCAL STATUTORY AND REGULATORY BARRIERS

Decentralized wastewater systems are primarily governed by state and local jurisdictions. Only three states do not have specific regulations governing decentralized systems (in California, Georgia, and Michigan, decentralized systems are governed at the local level) (NSFC, 1995: This reference also provides a matrix of the components of all existing state regulations for decentralized wastewater systems.) However, existing laws and regulations can be barriers to implementing decentralized systems. In many cases, states and/or localities:

- o Lack adequate enabling legislation to support proper management of decentralized systems.

- o Divide the legislative authority for public health and water quality protection between two or more branches of government, resulting in inequitable consideration of centralized and decentralized wastewater options and in inadequate management of decentralized systems.

- o Enact prescriptive regulatory codes that narrowly define the types of wastewater systems allowed, regardless of the fact that other types of systems can meet performance and regulatory standards.

These regulatory barriers as well as recommended changes are discussed below.

<u>Lack of Enabling Legislation</u> - Agencies responsible for decentralized wastewater systems must be vested with the powers necessary to effectively manage them, such as the right to access private property to inspect systems and correct system malfunctions. But state enabling legislation may not refer to decentralized wastewater systems or it may be vague or uncertain regarding legal powers to perform important management functions. Limited or unclear authority can prevent an agency from establishing a successful management program, which is a vital factor in ensuring that decentralized systems do not fail in the future.

<u>Legislative Authority Split Between Agencies</u> - Typically, state statutes divide legal authority for wastewater systems between state departments of health which are responsible for state sanitary codes for decentralized wastewater systems, and state departments of environmental protection which are responsible for regulations governing surface-water discharges; issuance of

NPDES permits, including those for centralized wastewater facilities; and various water quality programs. In some states , some aspects of onsite system regulation resides with state planning authorities or housing development agencies. Thus, legal authority for the two types of systems fall under separate, and confusing, legal jurisdictions at a fundamental level. Regulatory officials responsible for water quality programs historically have not considered decentralized wastewater systems as an acceptable option, and certainly not an option of equal stature with centralized facilities for protection of water quality.

Legal authority often is split between state and local governments. County governments are often delegated the task of developing and managing on-site disposal programs. Delegation of tasks to local entities from state government can and does work for wastewater management. Wastewater and water quality guidance coming from a single, centralized legal authority which clarifies responsibilities and facilitates selection and management of a centralized and/or decentralized system, whichever is most appropriate for the local circumstances.

Overcoming the Legal Barriers. Several steps can be taken to develop the requisite state enabling legislation and related legal authority. Existing legislative authority and institutional structures should be reviewed and be used, if possible, to minimize costs and simplify the regulatory process. For example, a simple local code enacted by a municipal or county health department for regular inspection and pumping might be adequate to significantly reduce onsite system failures in an area. Another example is that existing provisions for ground-water, septage, or general improvement districts could be used to establish a complete management program (Shephard, 1996).

If, however, existing legal authority is insufficient for implementing management responsibilities, state laws could be modified to extend the powers of relevant organizations (e.g., those that already manage centralized wastewater systems or other utilities) to cover the management of decentralized systems, to allow access to private property, or to create new management structures with necessary powers.

Some states or communities have developed or adopted model ordinances or legal agreements, such as the state of Iowa and the community of Kueka Lake, NY (see Appendix E). Examples include entering into service agreements with homeowners for system maintenance (conducted by either a local agency or a private contractor); obtaining property easements for inspections of decentralized systems; and establishing clear public/private ownership, inspection, operation, maintenance, and financial assurance responsibilities for cluster systems. Some cases may require special legislation that authorizes the creation of new entities (such as management districts) with explicit responsibilities for managing decentralized systems (see "Structure of the Management Program" below). Other states should use the model legislation to measure their current legislation against and make adjustments as needed.

The best way to clarify legislative authority is to consolidate programs for centralized and decentralized wastewater systems (e.g., in the state environmental protection agency or state health agency). Authority for specific management functions could then be delegated as appropriate to regional and local agencies. Such consolidation would allow for a comprehensive analysis and equitable appraisal of wastewater needs and how water quality goals could be best met. In addition, consolidating programs on the state and local levels fosters accountability and management program coordination for decentralized systems, which have heretofore not enjoyed much of either.

<u>State and Local Codes Stifle Consideration of Decentralized Systems</u> - State and local regulatory codes often prohibit or restrict the use of alternative onsite systems. These codes require the presence of a certain type of soil in order to build. Several factors influence the development of these codes, including inadequate performance data on alternatives, system complexity, and (most of all) lack of trained staff.

In addition, some communities have restricted decentralized wastewater systems to conventional onsite systems with large lot requirements (e.g., 2 to 5 acres) as a way to control increasing development densities and "maintain the character" of a community. These two subjects (onsite system requirements and land use) should be kept separate; land use control should be performed by zoning agencies, not public health agencies. Without the technical or financial resources to evaluate alternatives or provide necessary management, state and local governments rely on conventional septic tank/leach field systems and codify inflexible, overly conservative specifications that allow only passive, seemingly "maintenance-free" designs (Shephard, 1996). This approach continues to delay the need to address the real problem, which is the lack of a comprehensive management program for both conventional and alternative systems that would ensure their proper siting, design, construction, operation, maintenance, and monitoring. With such management, systems could be assessed and selected according to their ability to meet regional and local performance standards and their suitability for site-specific conditions.

Obtaining case-by-case variances from these restrictive regulatory codes is usually a cumbersome and expensive process. When a failing onsite septic system needs to be retrofitted or replaced quickly to protect public health and the environment, timely approval for an alternative system is unlikely. The result is continued use of an ineffective septic tank/leach field system or an expensive expansion of a centralized system.

Overcoming the Regulatory Barriers . The prescriptive regulatory approach (i.e., with state or local regulations prescribing specific types of systems and design parameters for sites meeting minimum conditions) currently followed in most states generally works only for sites with "ideal" soil and water conditions. In reality, however, most sites have less-than-ideal conditions.

To address varying site conditions, a few communities have established a combination of prescriptive- and performance-based approaches. They allow prescriptive designs for sites where conventional septic-tank/leach field systems can function properly. Performance standards are used for sites with limiting soil and water conditions (e.g., high ground-water tables, low-permeability soils, inadequate soil depth), for environmentally sensitive areas (e.g., coastal bays), in locations experiencing rapid development, and in areas where regional pollution problems already exist.

Some changes in the regulatory approval process that facilitate the use of decentralized systems have occurred or are underway. For example, a few state or local codes (e.g., in Kentucky, North Carolina and West Virginia) now include provisions allowing specific types of alternative systems, such as mounds or sand filters (although their use may be allowed only under certain conditions). A few states are also setting performance standards that would allow designers to select any type of system, as long as it is proven to meet the standards. These standards should specify the quality of the effluent discharged to the groundwater for all types of decentralized systems.

It should be noted, however, that some states attempting to set performance standards have been sued by involved parties who view the performance standards (which are equivalent to discharge standards) for new decentralized systems as too stringent. State officials and the regulated communities are currently re-evaluating specific standards. The problem has arisen because performance standards are not necessarily equivalent to effluent standards. In the case of surface discharge, where a centralized wastewater system discharges directly to surface water, the performance standards set for the facility are the same as the effluent quality standards. For decentralized systems that discharge to ground water, however, performance standards will be different from final effluent standards. The standard must account for the soil providing additional treatment before the wastewater reaches the ground water, the ground water quality and use, and the point of monitoring.

LACK OF ADEQUATE MANAGEMENT PROGRAMS

Few communities have developed organizational structures for managing decentralized wastewater systems, although such programs are required for centralized wastewater facilities and for other services (e.g., electric, telephone, water, etc.). Instead, state regulations prescribe the specifications and design of decentralized systems, and enforcement of these regulations falls to local agencies, often with limited authority, expertise, and staff. Inconsistent laws and policies have resulted in large, urban centralized wastewater facilities being effectively managed, while small, rural decentralized wastewater systems are frequently unmanaged.

The experience of many communities has shown, however, that to protect ground and surface water, decentralized systems, whether for individual or multiple dwellings, must be managed from site evaluation and design, through the life of the system. For individual dwellings, homeowners are responsible for managing their systems. Inadequate operation and a lack of routine maintenance for these systems have led to system failures and the resulting perception that decentralized systems are less reliable than centralized facilities.

An important objective of a management program for decentralized wastewater systems is to ensure that the systems perform satisfactorily over their service lives. In the past decade, some government officials and private citizens have begun to address the problem of failing septic systems in the context of water quality protection, rather than merely as part of private real estate transactions. This shift in perspective reinforces the need for communities to develop comprehensive management programs for decentralized systems.

The incentives for establishing proactive management programs for decentralized wastewater systems include better onsite system performance and environmental protection, extended life of the system, significant cost savings, planning flexibility, assistance for individual homeowners and developers in meeting requirements, and economic benefits accruing from the use of local contractors (Shephard, 1996).

Figure 2 depicts the typical functions of a wastewater management program, which include system planning, legal and financial needs and responsibilities, program coordination, supervision, of installation, operation and maintenance requirements, public participation and education, inspection schedules and monitoring programs. The planning process for wastewater management is described in Appendix B.

Generally, operation and maintenance requirements for decentralized systems are less complex, and less costly, than operation and maintenance requirements for centralized systems.

Overcoming the Lack of Management Barriers - Management programs should be developed on state, regional, or local levels, as appropriate, to ensure that decentralized wastewater systems are sited, designed, installed, operated, and maintained properly and that they continue to meet public health and water quality performance standards.

Structure of the Management Program: Selecting a Management Agency - The structure of a management program depends on the functions to be performed and the resources of the community. The institutional structure should include mechanisms for proposing and enforcing regulations, performing system inspections and maintenance, and monitoring program performance.

Many small communities have unpaid or part-time officials with no technical knowledge in wastewater management and minimal experience working with other levels of government. Therefore, the success or failure of a management program for decentralized wastewater systems may depend significantly on the choice of a management agency. Once a community defines specific functions needed to support system operation, it has to determine whether existing organizations have the statutory authority and resources to carry out these functions. If existing institutions lack certain legal powers, legislative modifications may be necessary (see "Regulatory Barriers" above).

Identify specific management agency (i.e. special district, municipal authority, municipal government, county agencies, regional agencies, State agencies, Federal agencies, private organizations, and other groups) and indicate responsibilities of each agency

								Comments
Planning/Administration								
Plan preparation								
Plan review coordination								
Research and development								
Office and staff management								
Site Evaluation								
Guidelines and criteria								
Evaluation certification								
Site suitability analysis								
System Design								
Standards and criteria								
Designer certification								
System design								
Design review								
Permit issuance								
Installation								
Construction supervision								
Installer certification								
Record-keeping								
Permit issuance								
Operation and Maintenance								
Procedures and regulations								
Operator/inspector certification								
Routine inspections								
Emergency inspections								
System repair/replacement								
Repair supervision								
Performance certification								
System ownership								
Residuals Disposal								
Disposal regulations								
Hauler certification								
Record-keeping								
Equipment inspections								
Facility inspections								
Facility operation								
Financing								
Secure funding								
Set charges								
Collect charges								
Monitoring								
Reporting system								
Sampling								
Public Education								
Develop methods								
Disseminate information								
Respond to complaints								

Figure 2. Management Program Functions for Decentralized Wastewater Systems

Several types of management arrangements are possible, which may involve existing local agencies, private organizations, or a combination of agencies and organizations, as described in Appendix C. In some cases, such as where wastewater management crosses jurisdictional boundaries, coordinated planning and sharing of natural, financial, and human resources may be necessary, possibly through inter-jurisdictional agreements. Existing or planned water protection programs may be a logical place to incorporate wastewater management programs. Different types of entities can provide management services including local government, private industry, and in some rural areas, management by rural electric cooperatives is being considered (see Appendix F).

Financing the Management Program - Effective management will increase the cost of decentralized wastewater systems, which currently have little, inadequate, or no management in many areas. A variety of financing options commonly used by utilities and other service providers may be adapted to decentralized systems; however, not all management entities have the legal authority to implement each option. The management entity selected may determine the type of financing available (i.e., whether the program will be eligible for federal or state grants; whether taxing is an option; or whether user fees can be collected).

Commonly used financing mechanisms applicable to wastewater management systems include:

- User fees
- Service fees
- Property taxes
- Punitive fees
- Permit fees
- Connection fees
- Special tax assessments
- Federal, state, or private grants or loans
- License fees

Some states and communities are also using creative funding mechanisms for water quality protection such as tobacco taxes, lottery revenues or license plate programs that could be used to partially fund onsite programs, especially retrofitting existing systems.

The issue of eligibility for public funding is discussed below in "Financial Barriers." Management programs for decentralized wastewater systems should, if possible, include a reserve fund to cover management functions and to alleviate some of the liability issues discussed below.

LIABILITY AND ENGINEERING FEE ISSUES

One of the factors that has impeded the acceptance and use of innovative and alternative onsite systems is the potential risk of installing systems that do not perform as anticipated. Due to this risk, regulators have, in many cases, not provided an environment that is conducive to trying out new systems. In some cases, the requirements to install and operate such systems are so administratively or economically burdensome (e.g., redundant systems) that they inhibit new or experimental solutions. As a result, homeowners or developers are often unwilling to accept the liability incurred with alternative systems. In the 1970s and 1980s, EPA's Innovative and Alternative (I&A) Technology Program provided grants of up to 100 percent of the cost for modifying or replacing I/A systems that failed to perform according to their design standards. The I&A program was terminated in 1990, and the current Clean Water State Revolving Fund program contains no similar "modification and replacement" provision. Thus this type of risk insurance no longer exists for the use of decentralized wastewater systems (GAO, 1994). In addition, the issue of liability has been raised in various communities where the use of decentralized cluster systems appears appropriate. Small communities are thus hesitant to choose these systems, despite their apparent advantages.

Engineers also face financial disincentives in designing lower cost decentralized systems since engineers' fees are sometimes based on a percentage of the project cost.

Overcoming the Liability and Fee Barrier . Liability can be addressed within the context of a management program, which can establish ongoing operation and maintenance programs to prevent system failures and mechanisms for covering failures should they occur (e.g., through federal or commercial insurance programs or escrow of a designated portion of system fees). Engineers can also obtain liability insurance. Engineering fees should be based on cost-plus-fixed-fee or lump-sum approaches.

FINANCIAL BARRIERS: PUBLIC GRANT AND LOAN PROGRAMS

Traditionally, EPA grants and loans for the construction of wastewater treatment facilities are available only to public entities. In such cases, if a community wishes to seek such funding, the management agency for decentralized wastewater systems must be a public agency. Private entities such as private contractors, individual homeowners, and homeowners' associations would not be eligible, except under certain provisions of the Clean Water Act that allow federal funds to be used for specific non-point source pollution management programs. Also, states have typically given funding priority to larger communities with more costly wastewater needs over smaller communities with lower-cost needs. Thus smaller communities typically are the last ones to receive wastewater funding assistance and often do not receive these types of funds. In addition, costs for planning purposes and for state review may be higher with alternative systems than for conventional systems. As a result, financially strapped small communities are not able or are reluctant to incur additional costs without financial assistance. At the same time, most small communities are not informed of how to pursue outside funding sources.

Overcoming the Financial Barriers. There are other federal sources of funding for public as well as private entities. The U.S. Department of Agriculture's Rural Utility Service provides funding through the Water and Waste Disposal loan and grant program to public entities, Indian tribes, and organizations operated on a not-for-profit basis, such as an association, cooperative, or private corporation.

Public grant and loan funds for wastewater management should be utilized to a greater extent to manage decentralized wastewater systems where eligible (i.e., the Rural Utilities Service's funding program, EPA's Hardship Grants program, the Clean Water SRF program for nonpoint source control and the CWA section 319 program). Community officials should be educated on the these eligibilities.

Chapter 5

EPA'S ABILITY AND PLANS TO IMPLEMENT DECENTRALIZED TREATMENT SYSTEMS

BACKGROUND

Over the past 20 years, EPA has put considerable resources into helping small communities meet their wastewater needs. This has been accomplished in many ways -- public education, technical assistance, technology transfer, research, demonstrations, and financing. It has been accomplished directly by EPA and state staff, and indirectly through federal funding of the many associations that have come together to support small community needs. Most of the outreach, which includes technical assistance and education has been grouped under the umbrella of EPA's Small Community Outreach and Education Program (SCORE). While EPA personnel have provided some direct technical assistance to small communities, EPA has primarily leveraged state outreach programs through grants and other assistance activities. In addition, assistance to other technical service providers foster activities such as development and distribution of educational materials, telephone consultation, classroom training and field assistance and training. In recent years, EPA's outreach program has been expanded to include special populations such as Native American Tribes and low income "colonias" along the U.S. - Mexico border.

This section responds to both areas raised by the House Appropriations Committee concerning EPA's ability to implement the alternatives within the current statutory and regulatory structure, and EPA's plans for implementation using fiscal year 1997 funds. Described below are ongoing and planned activities and programs conducted by EPA or with EPA assistance, which provide a framework for implementing alternatives such as decentralized treatment systems.

FUNDING

The Construction Grants Program required all but 4 or 5 states to set aside 4 percent of their annual allotments for communities with populations of 3,500 or less to be used only for alternatives to conventional sewage treatments works (Sec.205(h)). Many of these communities have treatment facilities which serve as demonstrations of decentralized technology. Last year, EPA initiated a program to conduct assessments of many innovative technologies funded under the Construction Grants program, and any other new technologies which have been put into use more recently. These assessments will continue over the next several years. As the assessments are completed, the information will be provided to our customers in various formats from technical reports to fact sheets to pamphlets.

Although there is no specific set aside for small communities or alternative systems in the Clean Water State Revolving Fund program (SRF), decentralized technologies are eligible for funding. EPA staff are aware of decentralized systems funded by the SRF around the country. In Pennsylvania, local banks process SRF loans for homeowners which fund onsite systems. Minnesota has developed the Clean Water Partnership Program that has provided funds to Brown, Nicollet and Cottonwood counties to re-loan to homeowners for conventional onsite system replacements. SRF funding has also provided assistance to the Osakis Lake Project to replace failing systems around Osakis Lake. The state of Washington provides SRF loans to local loan funds. These funds in turn provide loans to homeowners and small businesses for the rehabilitation or reconstruction of onsite systems. Ohio, Virginia and West Virginia are developing similar programs.

In an effort to expand the types of projects funded by the SRF, EPA issued the "Clean Water State Revolving Fund Funding Framework" in October 1996. This document was developed in conjunction with state SRF partners to clarify the eligible uses of SRF funds and provide tools to establish relative priorities among water quality projects. States are encouraged to assess water quality problems on a watershed basis and develop integrated priority setting processes. With the expansion of the SRF to cover activities included in EPA approved nonpoint source management plans, onsite treatment projects have a much greater potential for funding by the SRF. EPA plans to sponsor training workshops to further educate the nonpoint source community about the SRF as a potential source of funding for nonpoint source projects (including onsite systems) and facilitate coordination with the state SRF programs. Demonstration grants have also been issued to six states to develop integrated priority setting systems that can be used as models by states.

Recognizing that several federal agencies provide funds for wastewater collection and treatment, EPA is participating in an effort with USDA's Rural Utility Service and HUD to provide funding to communities in a more efficient and less burdensome manner. Improved coordination and cooperation between the Agencies will include:

- Coordinating funding cycles and selection systems on a State-by-State basis,
- Promoting the use of a lead agency for jointly financed projects, where suitable, to receive and review environmental review documents and ensure compliance with Federal cross-cutting legislation, and
- Encouraging the use of a single application on a State-by-State basis to address similar data requirements.

A memorandum outlining this effort, to be signed by the three Agencies, is being prepared. Follow-up actions to implement these improvements will be undertaken in fiscal years 1997 and 1998.

Most recently, EPA issued guidelines for a new $50 million Hardship Grants Program for Rural Communities. To qualify for hardship assistance a grantee must be a rural community with a population of 3,000 or fewer; lack centralized wastewater collection or treatment; have a per capita income less than 80% of the national average; and have an unemployment rate of one percent or more above the national rate. This program is designed to be managed in conjunction with the SRF program to make wastewater treatment more affordable to rural, economically disadvantaged communities. The Hardship Grant funds can be used to plan, design and construct publicly-owned wastewater treatment works and/or provide training programs for sanitarians related to the operation and maintenance of such systems. Although no grants have yet been made to communities, it is expected that many communities receiving hardship grants will have failing septic tanks. Decentralized systems may be viewed as the most economical treatment option for dispersed, rural communities. Examples of technical assistance that may be provided to communities are over-the-shoulder training, educational seminars, and assistance with development of local management districts. States that take advantage of this program can make strides toward eliminating the barriers identified earlier in this response. Financial assistance under this program will be provided to qualifying communities during fiscal years 1997 and 1998.

CWA Section 319 program grants are also available to assist States in implementing approved nonpoint source management programs. Section 319 grants have been used to support numerous projects that relate to decentralized system program implementation and technology demonstrations. Examples of projects that have been funded through Section 319 include: Demonstration of Alternative Onsite Systems; Maintenance of Onsite Constructed Wetlands; Analysis of Onsite Sewage System Impacts on Groundwater Quality; Onsite Septic System Demonstration and Training; Septic System Survey; Septic System Inventory and Inspection Education Program; and Evaluation and Upgrades of Onsite Systems.

OUTREACH, TRAINING AND EDUCATION

In addition to the ongoing outreach efforts conducted by EPA staff, several significant efforts, described below, are underway and will continue, which provide technical assistance to small communities.

Since 1979, EPA has funded the National Small Flows Clearinghouse, at West Virginia University in Morgantown. The Clearinghouse is the national repository and referral service for the transfer of information on decentralized, onsite, alternative collection and small treatment technologies and serves as a model for several other countries which are interested in establishing similar programs. The Clearinghouse services include: (1) a toll-free technical assistance hot line which answers over 3,000 assistance calls per month, (2) product distribution, which involves filling over 1,000 orders monthly for 10,000 publications, articles, reports, and videotapes, (3) publication of two newsletters and a professional journal reaching over 7,000 subscribers, (4) several national computer data bases on small community wastewater technology and regulations, and (5) a site on the World Wide Web. The Clearinghouse has a wealth of information available that can provide state and local regulators with the means to change laws and make technical decisions. Examples include: (a) maintaining a database and summary of all state regulations relating to onsite systems; (b) a recent survey of all health departments in the nation, identifying such information as the number of households served by conventional onsite systems, how many are failing, and what local regulations apply; (c) establishing a database on the testing of various onsite technologies conducted by six states in New England, and will also facilitating communication among the states regarding the testing results. The Clearinghouse services are being used more and more each year.

The Small Towns Environment Program (STEP) was funded several years ago through a grant to Rensselaerville Institute as a grass-roots, self-help program. STEP encourages the use of small alternative wastewater systems and calls for citizens to perform many functions the community would otherwise pay outsiders to do.

EPA also funds an organization based at West Virginia University, the National Environmental Training Center for Small Communities (NETCSC). This center supports environmental trainers nationwide through development and delivery of training curricula and training of trainers. Services also include a toll-free telephone line, quarterly news letter, and a training resource center with computer databases. Several courses have been developed on wastewater topics, including onsite and decentralized treatment. Examples include: “Assessing Wastewater Options for Small Communities”, “Basics of Environmental Systems Management”, “Onsite Wastewater System Operation and Maintenance”, and “Operation of Sand Filters”.

Some state organizations have already taken responsibility for onsite training. Presently at least six states have an organization with a center for training personnel associated with installing and regulating onsite wastewater systems (Arizona, Missouri, North Carolina, Rhode Island, Texas and Washington). EPA recently awarded a grant to the NSFC for establishment of a new onsite training center in Vermont.

TECHNOLOGY AND DEMONSTRATIONS

EPA's technology and demonstration programs have fostered and collaborated with others over the past 25 years to provide many of the technical guidance materials available today. Listed below is a summary of work that is currently underway.

- The National Onsite Demonstration Project is a three-phased, $3.5 million program to demonstrate alternative onsite wastewater systems. Funded by EPA through the NSFC, this program includes construction and monitoring of demonstration facilities, community education programs, technology transfer and building the capacity of states to implement appropriate systems. This project started in 1993 and is expected to be completed in the year 2000. Demonstration projects have been started in 12 communities in 10 states.

- EPA is in the process of updating two of its design manuals: "Design Manual for Onsite Systems" and "Design Manual for Constructed Wetlands Wastewater Treatment Systems". The Design Manual for Onsite Wastewater Systems is currently under development and is expected to be published in 1998. The manual on constructed wetlands will be completed within the next year. A manual on Small Community Technologies was recently updated.

- Several grants have been awarded, in the past two years, under the Environmental Technology Initiative, to design and demonstrate onsite technologies. These projects will be getting underway this year and the results will be made available within a couple of years, when demonstrations are completed.

- A grant to develop a research agenda for the field of onsite wastewater treatment and to begin some targeted research efforts is currently being prepared for award sometime later this year. This grant should help to coordinate research and uncover significant needs that are currently being missed.

- Within EPA, discussions are being held to establish a small community wastewater technology testing and verification program under the Environmental Technology Verification (ETV) program. ETV is a new program to verify the performance of innovative technical solutions to problems that threaten human health or the environment. This would allow manufacturers of onsite system technologies to obtain independent testing of their technologies. It would also allow state and local authorities to know that the technologies will meet acceptable standards.

- EPA's ground water program in cooperation with the wastewater program is currently developing a guidance manual for large septic systems; a type of decentralized treatment. This guidance is also under final quality review at this time and will be published by the end of the year.

- Outside EPA, and without EPA funds several demonstrations of technologies are also being conducted. Five onsite demonstration projects are being initiated this year by the Pennsylvania State Rural Electric Cooperative Association. The State of North Carolina has numerous demonstration activities focused on decentralized and onsite treatment. EPA will utilize these demonstrations in assessing new technologies. Also the NSFC is establishing a database which will serve as a repository of information on all projects demonstrating onsite wastewater technology.

PROGRAM DEVELOPMENT

EPA plans to collaborate with other federal agencies to develop guidance to assist communities to implement management systems. One such guidance document has been developed titled, "On-site Wastewater Management and Protection of Sensitive Receiving Water Systems: Planning for Opportunities." EPA also plans to promote the development of decentralized management programs which are based on performance goals. Under this effort, EPA plans to provide analytical tools and guidance to assist state and local governments in revising and updating decentralized system programs.

The Office of Water has promoted the watershed concept over the past several years to move toward the place-driven approach which will give holistic attention to ecosystems. This approach places the focus of watershed pollution abatement needs on the clean-up activities which will allow watersheds to meet their designated uses. Some watershed analyses have identified onsite systems as sources of pollution.

EPA is collaborating with other federal, state and local agencies as well as private partners, to achieve the ultimate goal of a healthy ecosystem in these watersheds. Many of the tools needed to accomplish this work already exist, although additional tools will be developed. They will have to be applied by the state and local authorities to solve the pollution problems that remain.

Once completed, the Office of Water will transmit this response to EPA Regional offices, State agencies, the National Rural Electric Cooperative Association, and other stakeholders and encourage them to take follow-up actions, as appropriate, to promote improved management and operation of decentralized wastewater treatment systems.

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